

NEWSLINE

Published weekly for employees of Lawrence Livermore National Laboratory

Friday, June 4, 2004

Vol. 29, No. 22

A magnetic attraction to science

By Charles Osolin
NEWSLINE STAFF WRITER

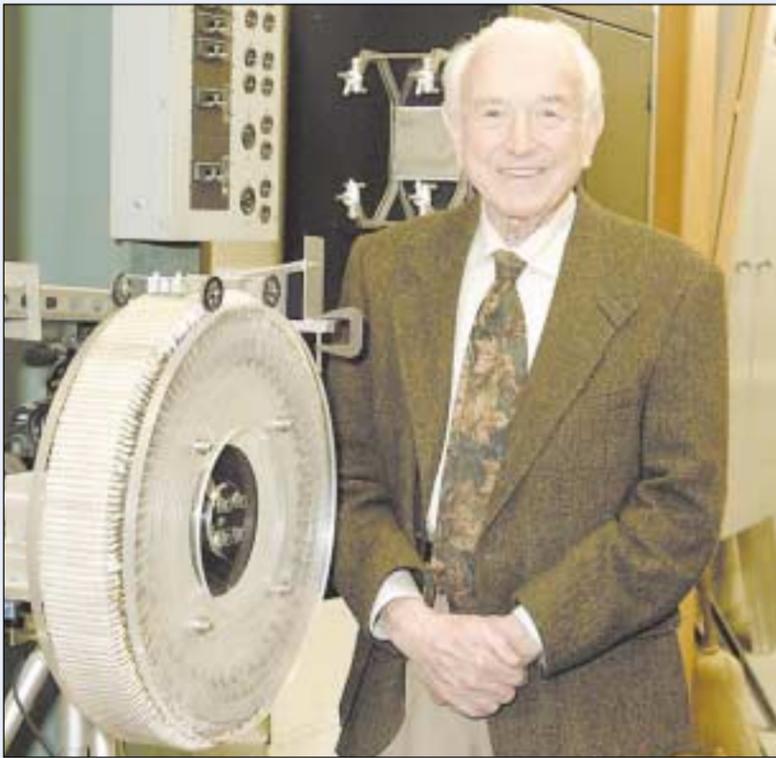
Anyone who's ever been intrigued by the seemingly magical properties of magnets should meet Dick Post.

Sitting in his office surrounded by a wall-to-wall clutter of books, research papers, reports and gadgets of various shapes and sizes, Post can barely contain his enthusiasm over the latest news about his favorite scientific tool.

"Here, take a look at this," he exults, turning to his computer and calling up a paper reporting on computer simulations of what Post calls a "new wrinkle" in

using magnetic fields to tap the fusion energy that powers the sun.

"A few years ago, Dmitri Ryutov of



FRANK NUNEZ/TID

Dick Post with magnetic levitation device.

Novosibirsk (Russia) came up with a way to stabilize an axisymmetric (cylindrical magnetic fusion) system," Post says. "It's very elegant, but also very simple. And we now

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science lives
LAWRENCE LIVERMORE NATIONAL LABORATORY

DOE tech transfer effort receives executive society's Licensing Achievement Award

The effort by the Department of Energy and its national laboratories to transfer research and technology to the private sector have been recognized with a 2004 "Licensing Achievement Award" from the Licensing Executives Society.

The society, with more than 6,000 members involved in various aspects of commercializing intellectual property, recognized the success of DOE's technology transfer program, which last year included 3,687 active licenses, 661 active cooperative research and development agree-

See **TECH TRANSFER**, page 8

NNSA report to Congress shows reduction in stockpile

Washington D.C. – National Nuclear Security Administration (NNSA) Administrator Linton F. Brooks, on behalf of the secretaries of Energy and Defense, has submitted a classified report to Congress showing a significant reduction in the nation's total nuclear weapons stockpile by 2012.

The stockpile contains reserve warheads that back up the operationally deployed nuclear weapons. In 2001, President Bush announced that the operationally deployed force would be reduced to 1,700 – 2,200 nuclear weapons by 2012. His decision was later codified in the Moscow Treaty.

For more information, see Brooks cover letter in the NNSA press release available on the Web at: <http://www.nnsa.doe.gov/>

Summer student employees arrive from corners of globe to support Lab programs

Linda Lucchetti
NEWSLINE STAFF WRITER

If you've noticed longer lines at the cafeterias and a lot of new faces at the Lab lately, then your observations can mean only one thing — the arrival of summer students.

This year, LLNL can expect approximately 450 temporary student employees who will come from colleges and universities around the world. California students come from both the State and UC system schools including the UC Berkeley; Cal Poly, San Luis Obispo; UC San Diego; and, the UC Davis. Out-of-state students hail from the University of Michigan,

See **STUDENTS**, page 5

DDLS talk looks at new gravitational physics

Michael S. Turner, the Bruce V. and Diana M. Rauner Distinguished Service professor in the Department of Astronomy and Astrophysics at the University of Chicago, will discuss "Cosmic Acceleration: New Gravitational Physics or Mysterious Dark Energy," at 3:30 p.m., Monday, June 21, as part of the Director's Distinguished Lecturer Series.

The riddle of the speed up of the expansion of the universe is one of the most profound puzzles in all of science. It touches upon a number of deep questions: What caused inflation? Is there a boson for every fermion? What is our cosmic destiny? How will Einstein's theory be extended to include quantum mechanics? And



Michael S. Turner

what has repulsive gravity?

Turner, whose research focuses on the earliest moments of the universe, will address these questions and more during the lecture in the Bldg. 123 auditorium.

Turner also holds appointments in the Department of Physics and Enrico Fermi Institute and recently has been appointed assistant director for Mathematical and Physical Sciences at the National Science Foundation (NSF).

A cosmologist, Turner has made important contributions to inflationary universe theory and the understanding of dark matter and the origin of structure. For more than 20 years

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Implications of nuclear review

— Page 3



A jolly good ASME fellow

— Page 4



Anatomy of an oil spill

— Page 8



LAB COMMUNITY NEWS

Weekly Calendar

Technical Meeting Calendar, page 4

Friday
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The **postdoc picnic** arrives today at 5 p.m. Come on out to Del Valle Regional Park for a BBQ with your fellow postdocs and families. If you need a ticket (\$5 or \$6 for a family) or more information, contact Colleen Elso, elso1@llnl.gov. Bring your appetite, drinks, your family and even your dog.

•••

A representative from **California Casualty Insurance** will be in the Benefits Office today. Appointments are required and may be scheduled by calling 2-9955. California Casualty offers individual rates to Lab employees by payroll deduction for auto and homeowner/renter insurance. As with any employee-paid insurance coverage, employees are encouraged to comparison shop.

Saturday
5

There will be a **scheduled power outage** today from 7 a.m. to 3 p.m. Bldgs. 230, 231, 232, 233, 234, 235 and Post 3C will be affected. Air conditioning, heating and elevators also will be affected. For questions, contact Mark Cardoza, 3-0490.

Sunday
6

There will be a **scheduled power outage** today from 7 a.m. to 3 p.m. Bldgs. 432, 433, 435, 436, 446, 448 and Trailers 4377, 4378, 4382, 4383, 4384, 4387, 4388, 4407, 4440, 4442, 4475 will be affected. Air conditioning, heating and elevators also will be affected. For questions, contact Mark Cardoza, 3-0490.

Wednesday
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The next CGSR seminar looks at the impact of technology on society. William E. Kastenber, Daniel M. Tellep Distinguished Professor of Engineering at UC Berkeley, will discuss "**Risk and Ethics: The Impact of Technology on Society**" at 1:30 p.m. today in Bldg. 170, room 1091.

•••

Historian Andrew Galvan will speak on "**The Ohlones of the San Francisco Bay Region**" at 7 p.m. today at the Museum On Main Street, 603 Main Street, Pleasanton. Reservations are required and admission is a \$5 per person donation. Call (925) 462-2766 for reservations. Galvan, a California Mission Indian descendant and Roman Catholic, is the curator of Old Mission San Francisco de Asis, Mission Dolores, in San Francisco.

Thursday
10

The Benefits Office is offering a workshop for those who wish to become educated on the fundamental principals of investing, titled "**Basic Investment Planning and Savings**." The next session will be held today from 8:30 a.m. - noon in Bldg. 571, conference room 1301. The cost of this workshop is \$45. Pre-registration is required. Register by visiting the Benefits Office or contact the Benefits Office at 2-9957.

RETIREES' CORNER

Janice (NIF, 2001) and **Leon Keller** (B Division, 2002) are currently enjoying a month in France. They are enjoying cool (in the 60s), sunny, spring weather, with flowers blooming everywhere. They take daily long walks exploring local sites and lunch at wonderful restaurants. Janice enjoys grocery shopping at the local farmers market and preparing dinner with the interesting ingredients available in France. They are staying in a little old stone house called la Bergerie, which is hard to heat.

Don't forget the next Laboratory blood drive, which is being held June 21-24 in the old central cafeteria (Trailer 4675). Because of the new badge policy for retirees, it will be necessary for blood drive volunteers and donors to call Marie Teuscher, 423-7892, in the LLESA office after 10 a.m., with your information — full name, social security number and birth date — several days in advance. When you get to the West Gate Badge Office on the day of your visit, your badge should be ready. You can also wait until the day you go to the blood drive and go directly to the West Gate Office, but it will take longer.

Because the Livermore Library is moving to its new facility, the LLNL Retirees Travel Slide Group has changed locations for March through June. The June 22, 2 p.m. meeting is being held in the Livermore Police Department Community Room, next to City Hall. This month's show is entitled "Holland in Spring Time" by **Margo and Arne Kirkewoog**. The travel

groups meets on the fourth Tuesday at 2 p.m., January through June, so this will be the last one of this year.

There will be no luncheon at Cattleman's Restaurant this month because of the picnic at Ravenswood at noon June 16. There is a maximum of 120 people, and at the time of this writing 104 people have signed up. Reservations, with the \$17 fee, can be accepted until we reach 120 people, or until June 10. To register go to the Web page: www.llnlretirees.org, or contact Alan Mode via e-mail at amode@ix.netcom.com, or by phone at 462-5202.

The nominating committee for next year's officers for the Retiree Association is being formed now. If you are interested or willing to serve your fellow retirees in any capacity, please contact Alan Mode at the above address or phone number.

If you are tired of hearing about **Jane and Gus Olson's** trips, please submit something of your own trips, volunteer activities, hobbies or anything else that retirees, or potential retirees, would be interested in hearing about. Oh, by the way, we did just return from a two-week trip back east to Indiana, New Jersey, North Carolina and Virginia. The North Carolina portion was to visit **Frank Rogue** (Electronics Engineering, 1993) with his new wife, Margie, at his new home. Please send any input to Jane or Gus Olson: e-mail: AugustO@aol.com or JaneRubert@aol.com; phone: 443-4349, snail mail address: 493 Joyce Street, Livermore, CA 94550.

IN MEMORIAM

Douglas R. Stephens

Douglas R. Stephens, a semi-retired Chemical Engineer, died May 9. He was 68.

Born in Portland, Ore., in 1935, Stephens spent most of his youth in Bellingham, Wash., where he became an enthusiastic outdoorsman and an avid hunter. He also enjoyed opera and was a member of the East Bay Opera Guild. A past president of the National Kidney Foundation of Northern California, he also was a transplant recipient and an active volunteer.

Stephens' career at LLNL began in 1961. He founded and led the High Pressure Process and Material Development section of the Chemistry Department for 10 years. Starting in 1966, he worked on the Apollo program under NASA. He analyzed moon rock samples collected by Apollo 11 astronauts in 1969. From 1972 to 1985, Doug was director of the Underground Coal Gasification program, where he was instrumental in growing the technology of harnessing the energy of coal deposits that are either too deep or too thin to mine conventionally.

Transitioning to weapons-related technology, Stephens was made assistant associate director for the Weapons, Lasers and Energy program in the Chemistry and Materials Science Department and then acting Energy Program director. He went on to become leader of the Weapons Surety Assessment program for the Defense and Nuclear Technologies Directorate, Q-Division until 1997. He was most recently employed by the Defense Technologies Engineering Division, W-Program.

Stephens received his bachelor's degree from the University of Washington in 1957 and received both his master's degree and Ph.D. from the University of Illinois in 1959 and 1961 respectively, in chemical engineering.

He is survived by his wife Mary, daughters Kathryn and Heidi, brother James and sister Kathleen of Washington, three grandchildren and numerous nieces and nephews.

A memorial service will be held at Oakmont Memorial Park and Mortuary in Lafayette on

Sunday, June 13, at 3 p.m. Donations may be made in Stephens' name to the National Kidney Foundation (E-mail: Patti@kidneyca.org for more information).

Earl A. Morrell

Earl A. Morrell, a 46-year Livermore resident, died Wednesday, May 26. He was 46.

Morrell was born Dec. 16, 1957, in Livermore. A lifetime resident, he returned home after serving in the U.S. Air Force. He worked as an engineer at the Lab for 10 years. His interests included rock n' roll music, cooking and dancing. He was a member of the Disabled Veterans Organization.

He is survived by his wife of eight years, Cheri; his stepsons, Richard Burton and Dennis Burton; his mother, Mary Morrell; his sisters, Renee Farrell, Cindy Honaker and Vicky Capps; and his niece, Elizabeth Farrell.

Memorial gifts may be made to the Veterans Nursing Home, 4951 Arroyo Road, Livermore, CA 94550.

Newsline

Newsline is published weekly by the Internal Communications Department, Public Affairs Office, Lawrence Livermore National Laboratory (LLNL), for Laboratory employees and retirees.

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Photographer: Jacqueline McBride

Designer: Julie Korhummel, 2-9709

Distribution: Mail Services at LLNL

Public Affairs Office: L-797 (Trailer 6527), LLNL, P.O. Box 808, Livermore, CA 94551-0808

Telephone: (925) 422-4599; Fax: (925) 422-9291

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Web site: <http://www.llnl.gov/PAO/>

NEWS OF NOTE



NPS talk examines impact of Nuclear Posture Review

By David Schwoegler

NEWSLINE STAFF WRITER

The Naval Postgraduate School's Professor James Russell broadly examined the implications of implementing the Nuclear Posture Review for U.S. security strategy in the Middle East.

The presentation was just one in a series of lectures resulting from the recently signed Memorandum of Understanding (MOU) between the Naval Postgraduate School and the Lab.

Russell framed implementation of Nuclear Posture Review (NPR) within the context of theoretical literature that surrounds the role of nuclear weapons in deterrent and coercive political strategies. Or as he described it, he would "...put the NPR in perspective...and think our way through how the strategic deterrent is going to function..." in a contemporary world of "...hardened underground facilities..." and "...revolutionary military affairs technologies."

Russell stated that "...policymakers are making the Middle East region the focus in the nation's nuclear strategy," adding that "...four of the five potential 'immediate' contingencies to



JACQUELINE MCBRIDE/NEWSLINE

From left: Harry Radousky of LLNL's University Relations Program and Professor James Russell of the Naval Postgraduate School, Monterey.

use nuclear weapons are Iraq, Iran, Syria and Libya."

He then applied his theoretical framework to

two coercive/compellant contemporary case studies. The first was a historical examination of Iraq from 1991-2003; second was an ongoing case with Syria, and in particular the Israel-Syria relationship.

Based on the preceding analysis, the lecture concluded with an assessment on the implications that these case studies hold for the ability of the strategic deterrent to assure friends and allies, deter adversaries, dissuade adversaries from competing against the United States, and defeat adversaries if necessary.

Russell is a senior lecturer for the National Security Affairs Department, within the Center for Contemporary Conflict at NPS. His expertise includes Persian Gulf policy and security; U.S. security strategy in the Persian Gulf and the Middle East; nuclear strategy; proliferation of weapons of mass destruction; transformation and defense strategy.

On June 9, as part of the NPS lecture series, professors Dave Netzer, Alex Bordetsky and Chris Manuel will present "Self-forming, Self-healing WLANS for UAVs, UVGs and AUVs."

For more information, contact Harry Radousky, 2-4478, from the University Relations Program.

Refresher beryllium awareness training required of all employees

Many employees still need to take the Beryllium Awareness biennial refresher training. All employees must complete the training by Aug. 1 as required by the Department of Energy/National Nuclear Security Administration.

The training is part of the Hazards Control Department's Chronic Beryllium Disease Prevention Program. Awareness training is required every two years for workers at any DOE site where beryllium has been used. Employees need to be aware of its presence and

health risks — even though they may not be exposed to or work directly with beryllium.

If you are potentially exposed to or work with beryllium you must take a more in depth training class (HS4256 or HS4257).

Employees may download the basic Beryllium Awareness Biennial Refresher Training (HS4258-RW) from the Web. By downloading and reading the booklet, employees will receive LTRAIN credit for completing the required refresher training.

They can also receive credit by going online and taking Web class HS4258-RW at: <http://www-hctrain.llnl.gov/SETS/HS4258-RW/HS4258-RW.html> Click on Web-Based Training, then on HS4258-W, Beryllium Awareness. The course takes about 30 minutes to complete.

If you must take this class and do not have a Lab e-mail address or ready access to a computer, contact your work supervisor for directions on how to meet this training requirement.

Wheels offers free ride to 'Spare the Air'

Wheels and the Bay Area Air Quality Management District are pulling together to help reduce

air pollution in the Tri-Valley by providing free rides on Wheels fixed-route buses whenever a "Spare the Air" alert is issued this season.

Wheels is a service of the Livermore Amador Valley Transit Authority.

A Spare the Air day is any day when air quality in the Bay Area is predicted to exceed the health standards set by the U.S. Environmental Protection Agency. The air quality forecasts are made by the Bay Area Air Quality Management meteorologists shortly after noon on the day before the bad air day is predicted in an effort to encourage residents to modify daily habits in a way that reduces air pollution.

"While the Bay Area has made steady



improvement in air quality over the past thirty years, the Tri-Valley area, due to wind, temperature and geographical conditions continued to exceed federal and state air quality standards" Supervisor Scott Haggerty said. "Every bit that each resident can

do to improve air quality makes a difference. We're asking that Tri-Valley residents take advantage of the chance to have free transportation, while at the same time, help to improve the air quality in the area."

To be notified of Spare the Air days (and those free Wheels rides) by e-mail, sign up for Spare the Air alerts at www.sparetheair.org.

Wheels is helping to make a difference. You can too. Leave your car at home and take the bus.

For information on routes, schedules and bus stop locations, contact the Wheels Transit Information Center at 455-7500 or visit www.wheelsbus.com.

High-energy gas gun shot is another JASPER success

The JASPER team successfully executed shot number 28 at the Nevada Test Site on May 20. The eighth consecutive successful plutonium experiment, this high-energy shot resulted in relatively low projectile tilt.

According to Test Director Mark Martinez: "The shot went very well and gives us added confidence that the gun continues to perform well. This was a hard-earned shot. The JASPER team deserves kudos for this one."

Preliminary results yielded a shot velocity of 7.22 km/sec, compared with a goal of 7.2 km/sec, or about 16,150 mph. The projectile tilted just 1.5 degrees — pending physics analysis. Both Flash X-Ray data recordings were correctly timed. And all 14 target-pins recorded properly. The final data analysis will take a couple of weeks to compile, but all indicators show shot 28 to be a complete success.

A part of NNSA's Stockpile Stewardship program, JASPER experiments yield information on the behavior of plutonium at high temperatures and pressures. That information contributes to computer simulation of the aging and operation of nuclear weapons to maintain their safety and reliability.



NEWS YOU CAN USE

Laboratory engineer Ray Stout named an ASME fellow

Laboratory engineer Ray Stout has been named a fellow of the American Society of Mechanical Engineers (ASME).

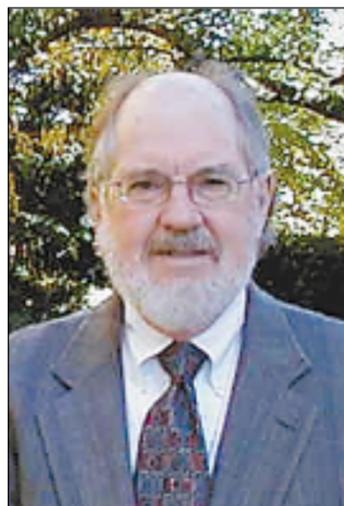
For more than 10 years, Stout had planning and technical management responsibility for experiments and analyses performed at Livermore, Pacific Northwest National Lab (PNNL), and Argonne National Lab (ANL) on radioactive waste forms.

The objectives were to provide models for: zircaloy cladding failure rate; oxidation rate of exposed UO₂ spent fuel; dissolution rates of exposed waste forms; and for release rates of all radioactive nuclides from spent fuel and glass waste forms during a proposed regulatory 10,000-year history in a potential nuclear waste repository at Yucca Mountain (YMP). These objectives were met and documented in YMP project publications.

Because of this nuclear waste form experience and subject knowledge, Stout was invited by the Commissariat à l'Énergie Atomique (CEA) of France to be a member of an International Scientific Advisory Board for their nuclear waste storage and disposition program.

In addition, Stout has an extensive background in dislocation and micro-crack kinetics dependent deformations and thermodynamics in solids and liquids, and their representations in failure, liquid turbulence, and shock propagation applications.

Stout, who has a Ph.D. in engineering mechanics from the Illi-



Ray Stout

nois Institute of Technology, has authored more than 40 publications and holds a U.S. patent. He also has a master's degree in mechanical engineering from Ohio State University and an MBA from the University of Pittsburgh in Pennsylvania.

Prior to joining the Lab, he worked for Bettis Atomic Power Laboratory, Westinghouse. As a result of his work at Livermore and Bettis, he has a broad discipline experience in applied math, engineering, materials, chemistry and physics. He also has experience addressing cost, performance, uncertainty, policy and systems issues.

Technical Meeting Calendar

Friday
4

B DIVISION

"The Advanced Simulation and Computing (ASC) Program," by Tom Adams. Naval Postgraduate School, Monterey. 11 a.m.; location at NPS to be announced. Contact: Brenda Foster, 3-8257.

INSTITUTE FOR GEOPHYSICS & PLANETARY PHYSICS

"From Magma Dikes to Pipes: Why Radial Symmetry of Volcanoes is Only Skin Deep," by John Eichelberger, University of Alaska, Fairbanks. Noon, Bldg. 319, room 205. Contact: Wil van Breugel, 2-7195, or Sharon Taberna, 3-6290.

Monday
7

BIOSECURITY & NANOSCIENCES LABORATORY

"Patterning Membrane Functions Using Light," by Atul Parikh, UC Davis. 2 p.m., Bldg. 151, room 1209. All attendees must be badged. Contacts: Jim De Yoreo, 3-4240, or Josie Morgado, 2-7181.

BBRP/UC DAVIS

"The BioBriefcase — Role in Homeland Security," by Allen Christian. 4 p.m., UC Davis, room 3001, Plant and Environment Sciences Building. Contact: Brenda Foster, 3-8257, UC Davis, 530-754-4331.

Tuesday
8

PHYSICS & ADVANCED TECHNOLOGIES DIRECTORATE-WIDE SEMINAR

"Understanding the Columbia Shuttle Accident," by Douglas D. Osheroff, Nobel Laureate, Stanford University. 10:30 a.m., Bldg. 123 auditorium, Contact: Alan J. Wootton, 2-6533.

H DIVISION

"Spectroscopic Study of Shock-Induced Molecular Dynamics at a Metal-Liquid Interface," by James Patterson, University of Illinois. 10:30 a.m., Bldg. 211, room 137 (controlled area). Contact: Choongshik Yoo, 2-5848, or Darlene Klein, 4-2868.

BIOSECURITY & NANOSCIENCES LABORATORY SEMINAR

"Controlled Growth of Carbon Nanotube Architectures and Devices," by Nathan Franklin, UC Santa Barbara. 2 p.m., Bldg. 155, room 1101 auditorium. All attendees need to be badged. Contact: Alex Noy, 4-6203, or Josie Morgado, 2-7181.

INSTITUTE FOR SCIENTIFIC COMPUTING RESEARCH

"Knowledge Discovery in Networks," by David Jensen, University of Massachusetts, Amherst. 10 a.m., Bldg. 451, room 1025 (property protection area). Contact: Tina Eliassi-Rad (CASC), 2-1552, or Leslie Bills, 3-8927.

LC CUSTOMERS MONTHLY MEETING

9:30-11 a.m., Bldg. 111, Poseidon Room (Q-cleared area). Contact: Teresa Delpha, 3-7329.

Wednesday
9

CENTER FOR GLOBAL SECURITY RESEARCH

"Risk and Ethics: The Impact of Emerging Technology on Society," by William E. Kastenber, UC Berkeley. 1:30 p.m., Bldg. 170, room 1091. Contact: Lisa Londry, 2-7957.

NAVAL POSTGRADUATE SCHOOL

"Self-Forming, Self-Healing WLANs for UAVs, UVGs and AUVs," by Dave Netzer, Alex Bordetsky and Chris Manuel, NPS. 3 p.m., Bldg. 155 auditorium. Badge required. Reception to follow. Contact: Brenda Foster, 3-8257.

Thursday
10

H DIVISION

"Observation of Spin Relaxation and Recombination in Polarized Atomic Hydrogen at Thermal Energies," by interviewee Hauke Kolster, Massachusetts Institute of Technology. 10:30 a.m., Bldg. 319, room 205 (controlled area). Contact: Neil Holmes, 2-7213, or Darlene Klein, 4-2868.

INSTITUTE FOR SCIENTIFIC COMPUTING RESEARCH

"SCons Project," by Steven Knight, founder/leader

SCons Project. 10 a.m., Bldg. 451, room 1025 (property protection area). Contact: Tom Epperly (CASC), 4-3159.

BIOSECURITY & NANOSCIENCE LABORATORY/CHEMICAL BIOLOGY & NUCLEAR SCIENCE

"From DNA to Diode: Assembly and Transport Properties of Chemically Synthesized Nanostructures," by postdoc applicant Sung-Wook Chung, Department of Chemistry, Institute of Nanotechnology, Northwestern University. 2 p.m., Bldg. 151, room 1209 Stevenson Room. Foreign nationals may attend if appropriate security plan is on file that includes Bldg. 151. Contact: Jim De Yoreo, 3-4240, or Katie Thomas, 2-7903.

Friday
11

INSTITUTE FOR GEOPHYSICS & PLANETARY PHYSICS

"First Extragalactic Results from the IRS Spectrograph on the Spitzer Space Telescope," by Henrik Spoon, Cornell University. Noon, Bldg. 319, room 205. All attendees must be badged. Contact: Wil van Breugel, 2-7195, or Sharon Taberna, 3-6290.

DNT COLLOQUIUM

"Moving Forward from the Nuclear Posture Review: A Washington Perspective," by Susan Stoner, LLNL/Washington D.C. 10:30 a.m., Bldg. 132 North, room 1000 (auditorium). Q clearance and SP access required, SFRD/no foreign nationals. Contact: Linda Stuart, 3-7001, stuart5@llnl.gov, or Frankie Springer, 3-6192, springer9@llnl.gov.

BIOSECURITY & NANOSCIENCE LABORATORY/CHEMICAL BIOLOGY & NUCLEAR SCIENCE

"Building an Episomal Model of Aging in *Saccharomyces Cerevisiae*," by postdoc applicant Alaric Antonio Falcon, Department of Anatomy and Cell Biology, University of Florida. 2 p.m., Bldg. 151, room 1209 Stevenson Room. Foreign nationals may attend if appropriate security plan is on file, which includes Bldg. 151. Contact: Julio Camarero, 2-6807, or Katie Thomas, 2-7903.

AROUND THE LAB



Cycletrons offer safety tips to avoid bicycle accidents

Since unsafe bicycle riding is potentially one of the most hazardous activities on site, the Lab's Traffic Safety Committee reminds employees to ride safely this month and every month, around the Lab and outside the gates. With approximately 800 orange Lab bikes and numerous personal bikes on site, bicycles are a popular and convenient mode of transportation. With summer just around the corner, use of the bicycles will increase even more. The Lab's goal is to have no biking accidents. Here are 10 bicycling safety tips offered by the Cycletrons, a LLESA bike riding networking group at the Lab:

- Always wear a properly fitted bike helmet. This is a reasonable personal consideration as head trauma is the cause of most serious injuries in bike accidents.

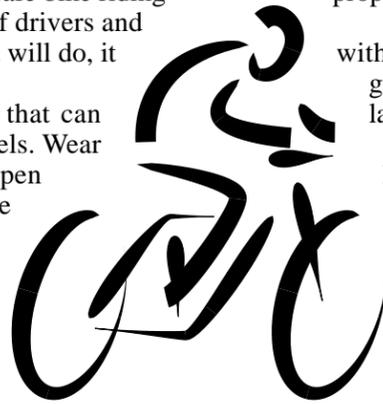
- When riding on the street, obey all traffic laws as if you were driving your car — it's the law. Always obey all traffic signals and signs, make turns from the appropriate lane and ride as far to the right as safely possible. Never ride in the oppo-

site direction of traffic. The key to safe bike riding is to ride in a predictable manner. If drivers and pedestrians can anticipate what you will do, it makes it safer for everyone.

- Do not wear loose clothing that can become caught in the chain or wheels. Wear appropriate footwear — sandals, open toe shoe, flip flops and bare feet are unsafe.

- Make sure the bike you use is in safe, working order. If someone has turned a Lab orange bike upside down indicating a mechanical problem, don't ride it. If you can't adjust the seat to the proper height — so you can comfortably pedal and brake — don't ride the bike. Before getting on any bike, do a quick inspection to be sure it is safe to operate.

- Understand how the brakes work. Lab bikes have coaster brakes, which work by applying back pressure on the pedals. If you are not used to these type of brakes, you may not instinctively react



properly in an emergency stop situation.

- If you are unable to stop the bike without skidding the rear tire, you are going too fast and/or braking too late.

- When the roads are wet, the tires lose much of their traction. Use more caution and slow down especially when negotiating turns.

- Strong winds also affect the handling of the bikes. Again, use extra caution and give yourself room on each side in case the wind unexpectedly pushes you off

line.

- When approaching pedestrians from the rear, announce your presence with a friendly warning. Before passing, say "on your left" so they know you are there.

- Do not park the bikes in an area that blocks traffic or entry/exit into buildings.

STUDENTS

Continued from page 1

University of Wisconsin, University of Texas, University of Washington, and Georgia Tech, to name a few. In addition, there are students from Canada, Germany, China, the Netherlands, Poland, Korea, Russia, England and France.

Molly Dougan of the Recruiting and Employment Division chairs the Lab's Institutional Education Committee (IEC) that convenes every spring to plan the annual slate of activities geared to the interests of student employees.

"This year's committee offers a good cross-representation of the Lab and a nice mix of new and returning committee members," Dougan said. "The committee has planned a wide array of events to assist the students in maximizing their Lab stay."

Dougan adds that the activities are ways for students to interact with Lab personnel outside their programmatic and directorate environments as well as with one another.

"While they are here, I hope the students will realize the breadth of science and engineering that the Lab engages in to support our national mission and get a sense of what it is like to work in a national laboratory," Dougan said.

The series of summer events kicks off off June 16 with a welcome reception for students hosted by Lab Director Michael Anastasio and Laura Gilliom, director of University Relations Program.

Panel discussions that address topics such as women in science, careers and challenges for young researchers, and graduate opportunities are offered this year, along with a variety of seminars. Students can also sign up to visit the UC, Berkeley campus and tour the Joint Genome Institute in Walnut Creek.

Students are encouraged to check out the full list of activities on the Student Bulletin Board at <http://education.llnl.gov/sbb/> and register on line.

**Come to the Fair! June 23, 2004
11 am - 7:30 pm LLNL Pool Area**

Health Fair!

Environment, Safety, and Health Fair!

Lunch Items for Sale!

Don't forget to attend the ES&H Fair!

Check out the exhibits and visit the poster gallery!

Get a bike safety check and learn about summer safety!

See LLESA aerobic exercise demos!
Learn about cancer prevention!

FREE
Ice Cream!
Chair Massages!
Cholesterol Checks!
Blood Pressure Checks!

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AUTOMOBILES

1998 - ACURA 3.5 RL SPECIAL EDITION, 40K miles, Black w/Gray Leather, Yokohama YK420s, Chrome Alloy Wheels \$17.5K 925-846-0645

1989 - Merker XR4TI, Red, leather, A/C, heated seats, power windows & locks, sun roof 2500.00 OBO 925-455-1098

1996 - Honda Accord Ex: 5speed/White/145K CD/TV,Playstation,DVD,4-12in Pioneer Subs, DC-Headers,Exhaust, AirCylinders, New Clutch/Brakes \$8,500 925-516-2607

2000 - Mitsubishi Eclipse GT, Burgundy, Black leather seats, power moonroof, CD, shiftstick, 70k miles, beautiful condition & performance, \$10,500. 925-292-3363

1992 - Mercedes 300E, 3.0 ltr, 4 dr sedan, gray, A/T, cruise, leather, sun roof, pwr/windows-locks, new brakes & tires. \$6900 925-447-6221

1990 - Ford Probe, clean, in good mechanical condition, and passes SMOG. Good first car for young driver. \$950. 925-518-9677

1989 - Honda Accord Lxi, Automatic Transmission, Sun/Moon Roof, In Good Running Condition W/ 203,400 Miles. Blue Book Value \$2000 Or Best Offer. 510-793-4711

1994 - Surburban, 4 wheel drive, 1 owner, truly ex cond, with reguarl maintenance 162K miles, \$8K or BO 925-484-4566

1981 - Buick Regal exc. condition, 110k miles asking 2000 obo. 925-373-7575

1995 - Olds. cutlass supreme, 150k mi, great condition. Asking 3000, OBO. 925-373-7575

2002 - Jeep Grand Cherokee-Overland Edition, 4.7 H.O. V8, 37K miles, Great condition, Loaded-have every option. 408-605-3533

AUTOMOBILE ACCESSORIES

2003 - Wheels and tires from BMW 325, 2 each, 7 spoke design. Tire size 205/55R16. Almost new. \$50 each 925-935-5004

BMW Front Passenger Seat for 320 or 2002. Tan vinyl EXCELLENT condition. \$175.00 510-581-4609

Bra for Lexus RX300. New, still in box. Paid over \$100. Only \$60. 925-648-0671

K&N Air Intake/Filter Kit for 4.8L, 5.3L & 6.0L GM vehicles. Smog legal, increase horsepower. Retail \$280, sell for \$200. 925-606-6533

BICYCLES

24 in. Youth size Mountain Bike. Giant, made by Specialized, 6 speed, metallic blue. Very good cond. \$75 209-521-2015

Burley DLite bicycle trailer. Fits 2 kids. Converts to stroller. Very good condition. Livermore. \$150. (Corrected phone number.) 925-443-2448

BOATS

19.5 ft Wellcraft, cuddy, V8, Volvo I/O, exc. cond., only 280 hrs, full canvas, new cover, tandem trlr. Fish, ski, dive. \$8,500. 925-634-9976

2001 Chaparral 186SSI, 19ft, only 12hrs, 230hp, xlnt cond., nice family boat w/ lots of options. \$18,750 obo 209-786-8864

ELECTRONIC EQUIPMENT

20-inch Panasonic TV, 1yr. old, \$100, Boom box, 2-cassete decks, CD, AM/FM, \$20. 925-371-1076

Mac Power Book G3 400 MHz, low battery \$300, Power Mac G4, monitor with CD burner and speakers \$400 925-443-9510

Super Nintendo Entertainment System with all components, 6 games, and instruction booklets. Excellent condition, \$30.00. 925-455-5985

Epson Stylus Color 880 printer. Compatible with PC or Mac. USB and parallel ports. \$30, OBO. 925-443-5525

DVD/Video equipment. APEX AD1200 DVD Player, \$30, OBO. Toshiba VCR, \$20, OBO. NEC 25 in. Video Monitor, \$30, OBO. 925-443-5525

Sony 36 inch FD Trinitron WEGA flat screen TV with two tuner picture in picture. Very good condition. Includes custom stand w/glass doors. \$750 925-831-1288

HDTV equipment. Samsung SIR-T351 tuner (\$200). Winegard HD9085 (\$45), HD9065 (\$30) antenna, AP-4800 pre-amp (\$25). Like new, half the price. 925-443-9182

GIVEAWAY

Free clean fill, Approx 20-25 yards South Livermore, you haul 925-443-8894

SPA, round in-ground fiberglass spa with pump and heater 925-443-1715

Two good size rat/rodent cages for pets. 925-648-8352

Weider Universal Weight Machine. Has Leg Press, Bench Press, Pull up, Lat and more. Disassembled and ready for pickup. 925-449-7966

HOUSEHOLD

Wood Stove. Great condition. \$150 or best. 209-825-8967

Garage Sale Sat. June 12. 10am to 5pm New clothes, toys, kitchen items, collectibles, beanies, book case, etc. 925-202-4737

Kohler Portrait Bath Lav Sink self rimming white, 22-5/8 x 18-7/8 new in box. \$75 925-606-6515

FULL size bed w/nightstand, IKEA/DALSELV model, unfinished wood, SPRING AIR firm mattress+pad, excellent condition (2yr old) \$200 OBO. 925-730-5279

White GE double oven(27in.w X 51in.h), cook top and over the range microwave. All work great. Prefer to sell all together. \$300 OBO. 925-373-9319

Star Wars 1, Phantom Menace, and Star Wars II, Attack of Clones, videos. Brand new, never opened. \$15/both. 925-648-0671

Moving sale, Saturday, June 5, 816 Seminole Dr, Livermore. Household items, electronics, furniture, lawn care equipment, tools etc. 925-371-1076

POOL TABLE - Full size with ping-pong table top, pool queues, balls, ping pong paddles all included. Sacrifice for \$750 OBO. 209-830-7272

Lazy-Boy Sleeper/Sofa and dual rocker/recliner loveseat. Blue. Excellent condition. \$300 each or both for \$550. 925-556-9819

Graco pack and play portable play pen \$20. Two first years portable high chairs \$5 each. 925-449-0947

Sofa & Love Seat - Southwestern design. Very good condition. Clean & Comfortable. \$300 209-579-7673

Lots of moving boxes used just once. All for \$25. 209-931-3141

Refrigerator. Amana, 24 in. cabinet depth, side-by-side, white. Very good condition. \$150. 925-743-1280

Garage Sale: Saturday June 5. Lots of miscellaneous. 4930 North Point. Discovery Bay. Time 9 a.m. to 4 p.m. 925-240-7990

Kirby Ultimate G vacuum, shampooer, upholstery and zip-brush etc. Like new used very few times. \$1200 or B/O 925-679-1288

Ethan Allen roll top desk. Full size and beautiful. Paid \$1300 sell \$400 925-829-1474

DESK, 54 x 29 inches. Dark Wood. \$30.00. Can deliver. 925-455-1730

Love the smell of varnish and sawdust? Four unfinished alder chairs. \$30 each, \$100 for all. 925-462-6527

Oak desk, 5 drawer with 2 file drawers. \$125 obo. Overstuffed chair, brown and tan stripe \$85 obo 925-606-5808

Entertainment Center, solid oak, holds 27 inch TV, 55 inches wide, 18 inches deep, 68 inches high. Digital picture available. \$125.00 925-443-1673

MISCELLANEOUS

PORTA POTTI, like new. Bellows flush. Paid \$100, sell for \$60. 925-606-6533

Push mower with grass catcher. \$50. 925-600-1817.

Electric dryer, \$150, 9-cycle/5-speed washer, \$150, refrigerator (15CF, 7CF freezer), \$250. All Whirlpool, 3yrs old. Eureka vacuum cleaner, \$25. 925-371-1076

Front door, fiberglass, 36 x 80, with all mounted hardware and brass kickplate. Excellent condition. \$50. 925-648-0671

Super Nintendo Entertainment System with all components, 6 games, and instruction booklets. Excellent condition, \$30.00. 925-455-5985 925-455-5985

Lion King, San Francisco - 2 VIP tickets, Wednesday, 7/14/04. at 8:00 pm, 4th row, center. Programs and VIP lounge included. \$130 each. 415-621-5065

Church pew. 9ft., Medium Oak, excellent condition- Dublin. \$250. 925-314-9478

Execric Scooter - Pride - Celebrity XL Purchased new in '96, was expensive. \$800 firm. 925-447-9622

Fisher Price Musical lights take along swing approx 2 feet tall 0-25 lbs. Like new \$25 925-456-7172

Cool-Stride jog stroller. Top of the line model. Like new. \$125 925-454-9253

GARAGE als, Saturday, June 5, 9:00 - 4:00 (NO early birds please). 794 SOUTH L ST., Livermore. 925-373-0751

Tractor-Ford 600,35hp,pto,3pt lift, 6ft scraper, old but reliable. \$3000 obo 209-786-8864

Craftsman 10 inch table saw. About two years old, little used. Paid \$165 sell \$50 925-829-1474

ROCKY Mountain and Wrangler Jeans like new sizes 1 and 3 925-586-5637

White speedylock surger sewing machine. brand new condition 1 hour use. paid \$450 sell \$350 firm. White sewing machine new \$150. 209-688-6084

Tickets OAK Athletics vs Toronto Blue Jays, Sat 6/6 or Sun 6/7, 1:05PM, MVP 3rd baseline, Section 125/Row 13/Seats 1&2 \$56/pair/game 925-449-5481

MOTORCYCLES

1993 Yamaha Seca II. One owner, always garaged, excellent condition, many upgrades. \$2,200. 925-600-1817.

2001 - Harley Sportster XL883C, 2001, red, less than 200 mi, just serviced. Like new with extras \$6,000 925-449-4994

2004 - Black BMW GS 1150. 600 miles, Loaded with options, to much to list. Must see to appreciate. Runs great. Must sell. Call for info. \$14,500 or B.O. 209-823-3848

2001 - Harley Davidson Low Rider, Jade Green, only 5K miles, 4 yrs left on ext wrnty, dealer serviced, exc

condition, many extras \$14,900 obo 510-881-8536

MUSIC INSTRUMENTS

Grand piano, 1983 Young Chang G-185 (6 ft. 1 in.) with matching bench. Polished walnut. Well maintained and in very good condition. \$6,000. 925-447-4352

PETS & SUPPLIES

Need a place to board my 3 year old paint (non-breeding) stallion in the Tracy vicinity. Excellent ground manners and very well-behaved. 209-814-5502

Medium sized parrot cage. For smaller parrots. \$150.00 obo 209-835-9282

RECREATION EQUIPMENT

Portable basketball hoop, 1 yr old, \$75, 925-606-6515

SCUBA tanks. 1 2400 psi steel 80 and 1 2400 psi steel 65. Just passed hydros and visuals. 925-454-9253

Surf rod and reel combo, Shakespeare ugly stik. Rod bws 1100 11 foot, 12 to 40 lb reel 2470 pro touch 95 to 340 yds like new, \$65.00 925-447-6099

Camp Chef triple burner camp stove w/ carry bag and wind screen. New in box. Retail for \$249.00 sell for \$150. 5 available 925-516-8339

RIDESHARING

Express your commute, call 2-RIDE for more information or visit <http://www-r.llnl.gov/tsmp>.

San Francisco - Looking to join a non-smoking carpool or vanpool as a rider only. Work hours are flexible. Contact 415-648-7857

Valley Springs - Car/vanpool - if carpool, will share driving. 209-772-0151, ext. 3-7709

Brentwood - Join our great carpool now. We meet at Albertsons. 925-516-2687, ext. 3-8927

Orinda - Lamorinda carpool seeks 4th driver/rider. Lab hours 8am-4:45pm. Meets near St. Stephens and Highway 24. 925-253-0498, ext. 2-9823

San Jose - --Seeking Ride Sharing from San Jose 408-268-7924, ext. 2-9107

Castro Valley - Vanpool - leaves Castro Valley Park n Ride 7:15am, arrives your building at LLNL by 8:00am, leaves LLNL 4:45pm, arrives CV 5:30pm. \$60/month 510-583-7630, ext. 2-4906

PATTERSON - Join the Vanpool and relax/sleep while I drive + lower your commute costs. 7:30-4 shift. Ridership based fares. 209-892-2118, ext. 2-9502

SERVICES

35mm slides of your artwork, crafts, models, jewelry - fast turnaround - Livermore studio - lafterhall.com 925-449-0107

Housecleaning by experienced, reliable Livermore resident. References available. 925-243-1622

SHARED HOUSING

Dublin - Room for rent in Dublin house. Full amenities/shared bath. Hot tub + big backyard. Available now. \$650/month + 1/3 utilities. 925-240-7053

Tracy - Room for rent/full bath in gorgeous 5 bed home. Beautiful pool/hot-tub, garage space for vehicle. Close access to freeway. \$800 plus 1/3 utilities. 209-830-7272

Manteca - Room for rent, large master, full house priv inc pool and spa. \$500.00/mo 209-640-1966

TO TRADE

TRADE- 03-04 Pathfinder LE 17x8 wheels trade for 03-04 Pathfinder SE 16x7. 209-609-2162

TRUCKS & TRAILERS

1998 - Dodge Ram 1500 Quadcab 20in. Wheels, new smog and reg., campershell, bedliner, automatic, PW, PL, AC, CC, V8. Runs, sounds and looks great!! \$9000 209-835-1598

1983 - 25ft EIDorado diesel motor home. Streamline design. 40k mi, generator, AC, awning. Meticulous condition. Original owner \$6000 obo 925-455-5223

2003 - 26ft. Salem travel trailer w/bunk beds, front bedroom. Like new. Take over payments. 209-522-9630

1979 - Argosy trailer 27ft, loaded with all optional groups. New upholstery, carpets, mattress, water heater. Low mileage and kept in garage. \$8000 925-447-2340

1997 - F-150 XLT 2wd V-8 Supercab, power everything, 54K miles, great shape, Green, setup for towing, very nice truck, \$9350. 925-846-7335

VACATION RENTALS

Embassy Suite Resorts, located at the Tahoe Queen Marina. June 19-25. Sleeps 8 (1 king, 2 queen, sleeper) 2 bedroom/2bath/full kitchen. Only \$850 (can't use it ourselves). \$1250 value. 462-3358

Solana Beach/Del Mar - Oceanfront condo, deluxe 2br., 2 1/2 ba., fully equipped, tennis, pools, jaczzis, gated and covered parking, near San Diego attractions. 925-443-2271

Maui, HI - Kahana Reef oceanfront 1BR/1BA condominium. Beautiful two-island view, oceanside pool, and BBQs. LLNL rates for year-round reservations. 925-449-0761

SOUTH LAKE TAHOE - 3 Bedroom 2 bath Chalet, Great location, nicely furnished, all amenities, great for families. 209-599-4644

Gualala, Mendocino Co - Stunning Whitewater Ocean Views! Just north of Sea Ranch, walking to downtown restaurants & shops, 2 bedrooms, \$180/dy base rate. 925-606-1845

WANTED

Wanted 3 Br 2 ba rental house in southwest Livermore for 5 months starting July 1st until new house is built. Have 2 indoor cats. 925-373-9319

Someone to do patio concrete work, reasonable. 925-449-3499

Trumpet for beginner student, reasonable. 925-443-9780

Teacher wanted for Introduction to Optical Engineering class at Las Positas College, Fall semester, MW 6-9pm, 209-239-5685

Free Camping Stuff for my Daughter, who is in the Navy. Thanks. 925-447-4941

Wanted - a used bicycle in decent condition for a petite woman. 925-960-9935Wanted extra long twin bed for college student. 925-672-3482

Wanted - Lightweight adult wheelchair at a reasonable price. 925-456-0503

Need weekly or biweekly house cleaning for 3b/2b home in country. Reliable and reasonable. Too much work to do outside, so I need help inside. 925-447-4830

Twin Beds for Mens Recovery Home in Brentwood. Donation Receipt. 925-382-4478

looking for a 21 foot to 30 foot RUNNING pontoon boat. Any year considered. 408-205-4272



JACQUELINE MCBRIDE/NEWSLINE

From heavens to homeland

Simon Labov, director of the Laboratory's Radiation Detection Center, explains to eight Stanford University students how astrophysics research can be used in developing detection technologies for homeland security. The students, who visited May 25, are taking a Stanford class on national security taught by former Lab Director Mike May. Shown behind Labov is the gondola for the High Energy Focusing Telescope. The students also visited the National Ignition Facility and received several briefings.

POST

Continued from page 1

have a real chance to do realistic simulations showing that it works."

While his colleagues at the Laboratory and around the world experiment with high-powered lasers and ponder exotic zero-point energy fields, Post is putting his money on the old-fashioned magnet to help solve the energy needs of the future.

A veteran particle physicist at the Lab, Post has devoted a lifetime to studying magnets in virtually all their forms and applications — from generating all-but-limitless energy via controlled nuclear fusion to providing energy-efficient transportation.

Post, who joined Livermore when the Lab was established in the early 1950s, retired in 1992 but quickly realized he still had "unfinished business."

At 85, he puts in four full days a week in his office and has no intention of slowing down. Holder of more than 30 patents and celebrated in engineering circles as the "father of the modern flywheel," Post could easily sit back and rest on his scientific laurels. But he continues to work on magnetic confinement fusion, determined to have the last laugh on skeptics who love to joke that fusion energy is 30 years away and always will be.

Post concedes that the path to fusion energy has been less than smooth. The technical challenges involved in attempting to harness the thermonuclear energy released by hydrogen bombs and the stars have been formidable, and political support for fusion research has been fickle.

By the mid-1980s, Post and his colleagues were making good progress in demonstrating the viability of the "open," or "magnetic mirror" approach to fusion. Cylindrical magnetic fields, pinched at their ends like a party popper, were used to confine superheated plasma, a gas consisting of electrons and positively charged hydrogen ions. The goal was to apply enough heat and pressure to allow the hydrogen nuclei to fuse and release more energy than the amount required to heat the plasma.

Government funding dried up, however, and the project was mothballed. Support for fusion research focused on another approach, using huge doughnut-shaped "closed" fusion reactors known as tokomaks. Magnetic mirrors, which were prone to plasma drift and leakage, slipped to the back burner.

But with funding from Livermore's Laboratory Directed Research and Development program, Post and his colleagues persevered — hoping to find a way to achieve controlled fusion that would be smaller and less expensive than tokomaks by sidestepping their chief drawback — turbulence. At the 100-million-degree-plus temperatures in the plasma's core, thermal and pressure fluctuations occur that trans-

port thermal energy from the core to the colder outer edges, making it difficult to sustain the temperatures needed for fusion.

"In magnetic fusion, you're faced with a turbulent regime," Post says. "You can deal with it either by making the reactor big enough so you can live with the turbulence, which is the tokamak approach, or by finding geometries that have shown low turbulence and making them into a practical fusion system."

That's where the exciting "new wrinkle" devised by Post's Russian colleague Dmitri Ryutov, now at Livermore, comes in. Post believes Ryutov's solution to stabilizing and containing the plasma in an open system — by "anchoring" it in place using small amounts of plasma on the outside of the magnetic field — has the potential to revive magnetic mirror fusion "in a form that would make it much more attractive for a fusion power system. The mirror machine could become the answer that fusion has been waiting for."

While fusion energy remains tantalizingly out of reach for now, many of the other uses for magnets that Post has invented and patented are beginning to find their way into a variety of practical applications.

One of the most promising is a simple and efficient way to use permanent magnets to levitate the trains in a mass transit system and eliminate most of the power drain caused by friction (think of the sound of a New York City subway train screeching around a bend). Livermore's "maglev" system uses a special arrangement of powerful magnets known as a Halbach Array to elevate the train above a guideway embedded with close-packed coils of insulated copper wire. Such trains are smooth, quiet, energy efficient, and capable of speeds of more than 300 kilometers an hour.

Physicist Klaus Halbach of Lawrence Berkeley National Laboratory developed Halbach arrays for use in particle accelerators. Arranging magnets so they create a periodic magnetic field that is alternately vertical and horizontal concentrates the field on one side while canceling it on the opposite side. A Halbach Array can levitate a weight 50 times heavier than its magnets.

Post said the maglev system, recently licensed by General Atomics of San Diego using the trade name Inductrack, is moving toward a large-scale demonstration. He said Inductrack is "nowhere near as complex" as the maglev systems currently being tested in Germany and Japan.

Inductrack requires neither the costly cryogenic cooling systems needed by the superconducting magnets in the Japanese system, nor the complicated sensors and feedback circuits of the German system. What's more, Inductrack trains would be inherently stable and safe: In the event of a power failure, they would coast smoothly to a stop and settle back

on their auxiliary wheels. Post said they're also particularly well suited for low-speed urban mass transit systems, because they can accelerate rapidly and easily handle steep grades and tight turns.

The idea for magnetic levitation grew out of Post's research on electromechanical batteries, which use circular Halbach arrays, advanced flywheels, and nearly frictionless "passive" magnetic bearings (invented by Post, naturally) to store energy much more efficiently than conventional electrochemical batteries.

Flywheels first captured Post's attention "as a sidelight" in the early 1970s, when he and his son Stephen, an electric car buff, wrote a seminal article for *Scientific American* suggesting that flywheels made of composite materials instead of metal could be used to store energy in electric vehicles. The idea of flywheel batteries grew in popularity over the years as high-strength graphite material became available at acceptable costs and new design principles were conceived.

Post's flywheel battery technology was licensed to a San Francisco company in 1994, and is currently being developed for such applications as uninterruptible power supplies for computers and other sensitive electronic equipment, and to provide energy storage for wind and solar power systems.

The licensee has also received funding from the federal government to develop hybrid diesel-electric buses and trucks using flywheels, as part of the government's efforts to reduce lung-damaging particulate emissions from diesel engines by 90 percent, while cutting diesel fuel consumption in half.

Manufacturers of hybrid automobiles, however, have yet to adopt flywheel batteries; both Toyota and Honda use electrochemical batteries in their popular gasoline-electric hybrid cars. Post remains convinced that flywheel batteries are a better idea.

"Somebody should really take the flywheel seriously for hybrid vehicles," he said. "Flywheel batteries are over 92 percent efficient in returning the energy put into them, versus 70 percent to 85 percent for an electrochemical cell.

"They should also have a very much longer life than an electrochemical battery. The only way to achieve reasonable battery life (in a standard battery) is to use very shallow charge/discharge cycles, and that means you need a battery with typically five times the capacity.

"In fact, in terms of energy efficiency," Post said, his eyes twinkling, "a vehicle that uses hydrogen fuel cells and a flywheel battery would be an excellent combination..."

To someone like Dick Post, the appeal of saving that much energy can only be described as...well, magnetic.

Scientist to look at long-term impact of crude oil spill

Barbara Bekins of the U.S. Geological Survey (USGS) will discuss "The Influence of Hydrogeology on 25 Years of Natural Attenuation at a Crude Oil Spill Site" at 1:30 p.m. Wednesday, June 16, in the Bldg. 543 auditorium.

The lecture, sponsored by the Energy and Environment Directorate, will focus on the USGS Toxic Substances Hydrogeology Program that conducts studies on the fate of contaminants in the natural environment. Results from the research have documented the effectiveness of a variety of individual processes that together contribute to natural attenuation of several classes of contaminants.

This talk will illustrate important principles using examples from research at a crude-oil spill site located near Bemidji, Minn. The Bemidji results show that groundwater flow plays a central role in regulating subsurface microbial activity during natural attenuation. Microbial populations and reaction rates are inextricably linked to recharge, permeability and hydraulic gradient.

At the Bemidji site, degradation rates for constituents of non-aqueous crude oil vary strongly with recharge rates. In addition, the temporal evolution of microbial populations and associated benzene degradation capabilities vary with permeability. The Bemidji results show that thorough characterization of the hydrogeology of a site is essential for understanding the subsurface microbial populations, their activities

and the associated effects on water quality.

Bekins has been selected as the Geological Society of America's 2004 Birdsall-Dreiss Distinguished Lecturer, sponsored by the GSA Hydrogeology Division and funded by the GSA Foundation. After studying both geology and mathematics, Bekins received a bachelor's degree in mathematics from UCLA. She worked for eight years as a computer specialist in the Seismology Branch of the USGS, and studied part-time to earn a master's degree in mathematics from San Jose State University. She then left the USGS to pursue Ph.D. studies at UC Santa Cruz where she studied under the direction of Shirley Dreiss. Dreiss was the 1992 GSA Birdsall lecturer, and the lectureship was renamed "Birdsall-Dreiss" after her untimely death in 1993.

Bekins' thesis research focused on numerical modeling of groundwater flow and solute transport in the Barbados subduction zone. After completing her Ph.D., she obtained a postdoctoral position at the USGS, modeling the biodegradation of groundwater contaminants with funding from the Environmental Protection Agency. In 1997, she joined the USGS staff as a research hydrologist in Menlo Park.



Barbara Bekins

From 1998 to 2000, she was a member of the National Research Council's Committee on Intrinsic Remediation. The committee's report, "Natural Attenuation for Groundwater Remediation," describes the capabilities of natural attenuation and the adequacy of the published guidelines for demonstrating its effectiveness. Bekins also has sailed as a shipboard scientist on Ocean Drilling Program Leg 171A to the Barbados subduction zone in 1997 and Leg 201 to the Peru Margin in 2002. More recently, she has been working with the USGS National Water Quality Assessment Program on the fate of agricultural chemicals in the subsurface.

Bekins' current research interests encompass two broad areas. The first is the role of groundwater along plate-boundary faults, including effects of pore pressure on fault strength and the use of natural tracers to understand regional flow systems. The second involves the effects of groundwater flow and aquifer properties on subsurface microbial activities including natural attenuation of contaminants.

For more information on Birdsall-Dreiss Lecturers, visit the GSA Hydrogeology Division Website at <http://www.geosociety.org/aboutus/awards/birdsall-dreiss.htm>.

TURNER

Continued from page 1

he was a member of the scientific staff at the Fermi National Accelerator Laboratory. Turner and Edward Kolb helped to establish the Theoretical Astrophysics Group at Fermilab and wrote the monograph, "The Early Universe."

Turner received his bachelor's degree in physics from the California Institute of Technology (1971) and his Ph.D. in physics from Stanford University (1978). His association with the University of Chicago began

in 1978 as an Enrico Fermi Fellow, and in 1980 he joined the faculty. Turner is a Fellow of the American Physical Society and of the American Academy of Arts and Sciences as well as a member of the National Academy of Sciences.

Among the numerous honors and awards he has received are the Helen B. Warner Prize of the American Astronomical Society, the Julius Edgar Lilienfeld Prize of the American Physical Society, the Halley Lectureship at Oxford University, and the Quantrell Award for Excellence in Undergraduate Teaching at Chicago. Turner has served on or chaired advisory committees

for many federal agencies, including the NRC, DOE, NSF and NASA. He also served as the president of the Aspen Center for Physics from 1989 to 1993.

His talk will be rebroadcast on Lab Channel 2, at 10 a.m., noon, 2, 4 and 8 p.m. on Thursday, July 1, and at 4 a.m. Friday, July 2.

For more information about Turner, go to http://physics.uchicago.edu/t_astro.html#Turner <http://olpimages.nsf.gov/viewstaff.cfm?staff=75>

For more information about DDLS, contact Mona Garcia, 2-5214, or go to the DDLS Website at <http://lsto.llnl.gov/DDLS/index.html>.

TECH TRANSFER

Continued from page 1

ments, 1,948 active work-for-others agreements with non-federal sponsors, and more than \$25 million in licensing income and royalties collected.

The Laboratory, which has one of DOE's most active tech transfer programs, collected a record \$4.1 million in royalty income last year.

In a letter announcing the award, Energy Secretary Spencer Abraham commended the DOE licensing and technology transfer community for "facilitating the exploitation of federally-funded research and development programs for the benefit of the American public."

Among the successful technologies Abraham cited were the development of new cancer treatments, a microbattery for medical and industrial uses, a decontamination solution for chemical and

biological warfare agents, DNA testing systems for rapid detection of biothreat agents, and a high-speed optical scanner designed for photovoltaic materials and devices.

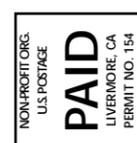
"Thank you for the contributions you make each day to the technology transfer mission," Abraham wrote. "Your actions reflect well on your organizations and the Department of Energy as a whole."

Lab lift off



JACQUELINE MCBRIDE/NEWSLINE

Division leader Joe Galkowski (right) of the Defense Sciences Engineering Division presents Jose Hernandez, who was recently selected as one of 11 2004 astronaut candidates, with a congratulatory card signed by his Lab colleagues during a celebration Wednesday.



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